

LIMITED CARDIAC CATHETERIZATION CURRICULUM

The purpose of this curriculum is to indicate what areas of knowledge the limited radiographer must obtain in order to be licensed by the Indiana State Department of Health. The educational program does not necessarily have to directly provide all of the curricular areas. The educational program is only required to ensure that each student has completed the curricular areas. Curricular areas may be attained through didactic provided by the educational program, training obtained during clinical training, or previous educational experiences of the student. The educational program only needs to have a system in place for ensuring that each student has completed the curricular portion of the educational program and a system for documenting that each student's education.

- I. Radiographic Terminology – Cardiac Catheterization**
 - A. Common Medical Terms
 - B. Medical Abbreviations and Symbols
 - C. Terminology Associated with Cardiac Catheterization Procedures
 - D. Terminology Associated with Cardiac Catheterization Orders and Requests
- II. Patient Care and Management**
 - A. Medical Emergencies
 - B. Allergic Reactions to Radiographic Contrast
- III. Imaging Production and Evaluation**
 - A. Analog Imaging
 - B. Digital Imaging
 - C. Density (mAs, distance, film-screen combination)
 - D. Contrast (kVp, filtration)
 - E. Recorded Detail (motion, poor film-screen contact)
 - F. Distortion (magnification, OID, SID)
 - G. Demonstration of Anatomical Structures (positioning, tube-part-image receptor alignment)
 - H. Identification Markers (anatomical, patient, date)
 - I. Patient Considerations (pathologic conditions, motion)
 - J. Artifacts (film handling artifacts, static, pressure artifacts)
 - K. Fog (age, chemical, radiation, temperature, safelight)
- IV. Radiation Protection and Radiobiology**
 - A. Patient Protection
 - 1. Biological Effects of Radiation
 - a. Dose Effect Relationships
 - b. Long Term Effects
 - i. cancer
 - ii. cataracts

- iii. life-span shortening
 - c. Somatic Effects
 - i. embryonic and fetal effects
 - ii. bone marrow
 - iii. eye/thyroid
 - iv. skin
 - v. breast
 - d. Genetic Effects
 - i. genetic significant dose
 - ii. goals of gonadal shielding
 - e. Relative Tissue Radiosensitivities
 - i. dose-response relationships
 - ii. relative tissue radiosensitivities (e.g. LET, RBE)
 - iii. cell survival and recovery
- 2. Minimizing Patient Exposure
 - a. Exposure Factors
 - i. kVp
 - ii. mAs
 - b. Shielding
 - i. rationale for use
 - ii. types of protective devices
 - iii. placement of protective devices
 - iv. storage and testing of protective devices
 - c. Beam Restriction
 - i. purpose of primary beam restriction
 - ii. effect on secondary (scatter) radiation
 - iii. types (e.g. collimator, cones, aperture diaphragms)
 - d. Filtration
 - i. effect on skin and organ exposure
 - ii. effect on average beam energy
 - iii. NCRP recommendations (NCRP #102, minimum filtration in useful beam)
 - e. Repeat Exposure Reduction
 - i. patient positioning
 - ii. patient communication
 - f. Image Receptors
 - i. types
 - ii. relative speed

B. Personnel Protection

- 1. Sources of Radiation Exposure
 - a. primary x-ray beam

- b. secondary radiation
 - i. scatter
 - ii. leakage
 - c. patient as source
 - 2. Basic Methods of Protection
 - a. time
 - b. distance
 - c. shielding
 - 3. Protective Devices
 - a. types
 - b. attenuation properties
 - c. minimum lead equivalent (NCRP #102)
- C. Radiation Exposure and Monitoring
- 1. Units of Measurement
 - a. absorbed dose (rad)
 - b. dose equivalent (rem)
 - c. exposure (Roentgen)
 - 2. Dosimeters
 - a. types
 - b. proper use
 - 3. NCRP Recommendations for Personnel Monitoring (NCRP #116)
 - a. occupational exposure
 - b. public exposure
 - c. embryo/fetal exposure
 - d. ALARA and dose equivalent limits
 - e. evaluation and maintenance of personnel dosimetry records

V. Radiation Production

- A. X-ray Production
- 1. source of free electrons
 - 2. acceleration of electrons
 - 3. focusing of electrons
 - 4. deceleration of electrons
- B. Target Interactions
- 1. bremsstrahlung
 - 2. characteristic
- C. X-ray Beam
- 1. frequency and wavelength
 - 2. beam characteristics
 - a. quality
 - b. quantity
 - c. primary vs. remnant (exit)
 - 3. inverse square law

4. fundamental properties (e.g. travel in straight lines, ionize matter)
- D. Photon Interactions with Matter
1. Compton effect
 2. photoelectric absorption
 3. coherent (classical) matter
 4. attenuation by various tissues
 - a. thickness of body part (density)
 - b. type of tissue (atomic number)

VI. Cardiac Catheterization Radiographic Procedures

- A. Patient Positioning for Cardiac Catheterization Procedures
- B. Anatomy and Pathology Related to Cardiac Catheterization